Successful treatment of scleroderma renal crisis with enalapril

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Summary: A patient with scleroderma renal crisis is described. At presentation he had severe hypertension, deteriorating renal function, microangiopathic haemolytic anaemia, and elevated levels of renin, aldosterone and noradrenaline. Enalapril controlled blood pressure, stabilized renal function, lowered aldosterone and noradrenaline levels, and improved peripheral circulation. It appears that converting-enzyme inhibitors can favourably alter the outlook of this otherwise fatal disorder.

Introduction

Scleroderma renal crisis is characterized by abrupt onset or exacerbation of hypertension, hypertensive retinopathy, activation of the renin-angiotensin system, and rapid deterioration of renal function (Traub *et al.*, 1983). Until the 1970s treatment was ineffective and death occurred within 1 year (Traub *et al.*, 1983). Longevity increased with the advent of renal dialysis, vigorous anti-hypertensive therapy, or bilateral nephrectomy but the outlook remained bleak. Since 1979, a number of reports described successful treatment of scleroderma renal crisis with the angiotensin converting-enzyme (ACE) inhibitor, captopril (Lopez-Ovejero *et al.*, 1979; Thurm & Alexander, 1984). We now report correction of biochemical and blood pressure abnormalities together with improvement in general clinical status and renal function with the second ACE inhibitory, enalapril, in a patient with scleroderma renal crisis.

Case report

A 45 year old white man was referred to the Hypertension Clinic. His blood pressure, previously normal, became elevated and was unresponsive to prazosin, and he developed nocturia and intense thirst. For 3 years he had suffered Raynaud's phenomenon, intermittent arthralgia and general malaise. Investigations, including renal function, had been normal. Examination revealed a miserable, unwell man, complaining of severe headache. Changes typical of scleroderma included acrocyanosis, calcinosis, telangiectasia, and thickening and tethering of skin on the hands. The

blood pressure was 240/140 mmHg and he had a tachycardia (114 beats/minute). The fundi were free of haemorrhages, exudates and papilloedema. Laboratory testing showed microangiopathic haemolytic anaemia, elevated plasma levels of urea, creatinine, renin activity (PRA), noradrenaline and aldosterone (Figure 1). A diagnosis of scleroderma renal crisis was made and treatment started with enalapril.

Over the next 7 days while taking enalapril alone, his arterial pressure fell to around 140/90 mmHg, nocturia and headache disappeared, the peripheral circulation improved markedly, and normal vigour was restored. Since plasma urea and creatinine levels increased initially and urine sodium output was over 200 mmol/24 h, his diet was supplemented with

Figure 1 Hormones, renal function and arterial pressure in a patient with scleroderma renal crisis before and during treatment with enalapril. The normal range for plasma creatinine is 0.05–0.11 mmol/l and for plasma urea is 2.7–7.8 mmol/l.

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sodium for 6 days. Enalapril treatment resulted in a fall in plasma aldosterone and noradrenaline, and a rise in PRA (Figure 1). Subsequent follow-up showed normal blood pressure (average 130/85 mmHg), stable levels of urea and creatinine, normal concentrations of noradrenaline and aldosterone, and high PRA (Figure 1). A low dose of enalapril (5 mg/day) was sufficient to maintain a normal blood pressure. Renal biopsy revealed typical changes of scleroderma on light microscopy.

Discussion

This patient had typical features of scleroderma renal crisis including activation of the renin-angiotensin system. In addition, plasma noradrenaline was high suggesting heightened activity of the sympathetic nervous system. Enalapril reduced angiotensin II formation as reflected by the fall in aldosterone and rise in PRA, while noradrenaline levels returned to

normal. These changes were affected by a small dose (5–10 mg/day) of the drug. As has been reported with captopril (Lopez-Ovejero *et al.*, 1979; Thurm & Alexander, 1984), enalapril normalized blood pressure, stabilized renal function, and improved peripheral circulation. This and another report (Smith *et al.*, 1984) suggests that inhibition of converting-enzyme, rather than treatment with any specific ACE inhibitor, can alter favourably the outlook in this otherwise fatal disorder. Although alternative forms of antihypertensive treatment have occasionally halted the progression of scleroderma renal crisis (Barnett, 1981), it appears that ACE inhibitors are drugs of first choice in this disorder.

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